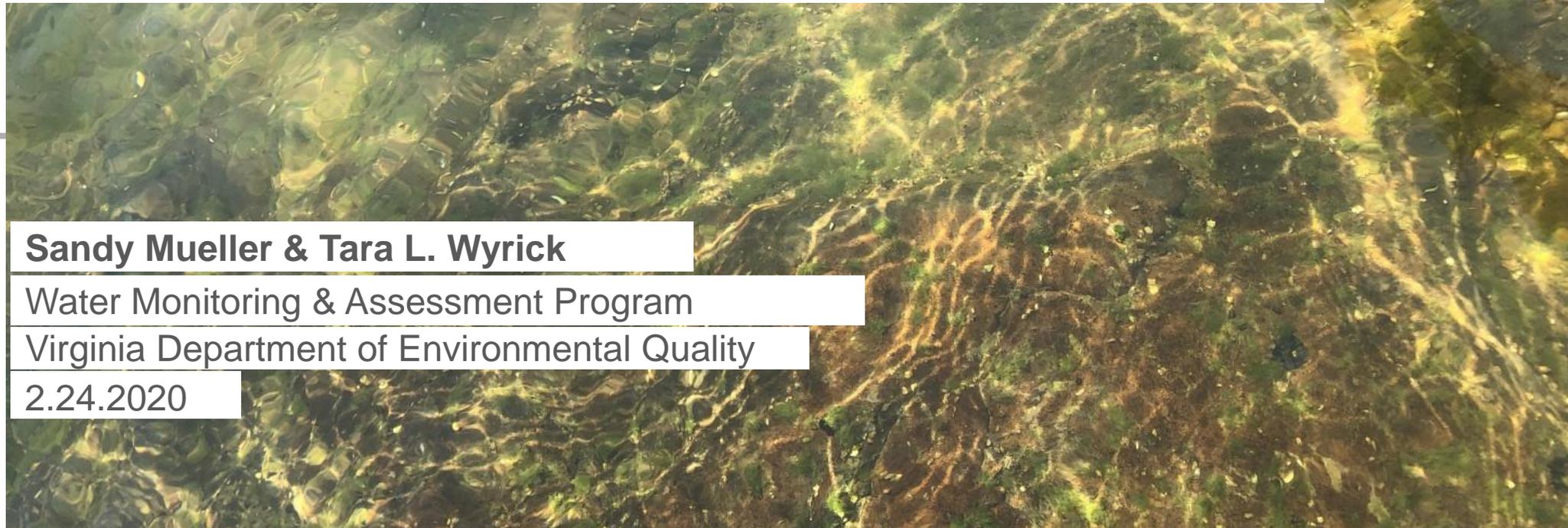






Shenandoah River Algae Monitoring

Overview and 2019 Season Summary



Sandy Mueller & Tara L. Wyrick

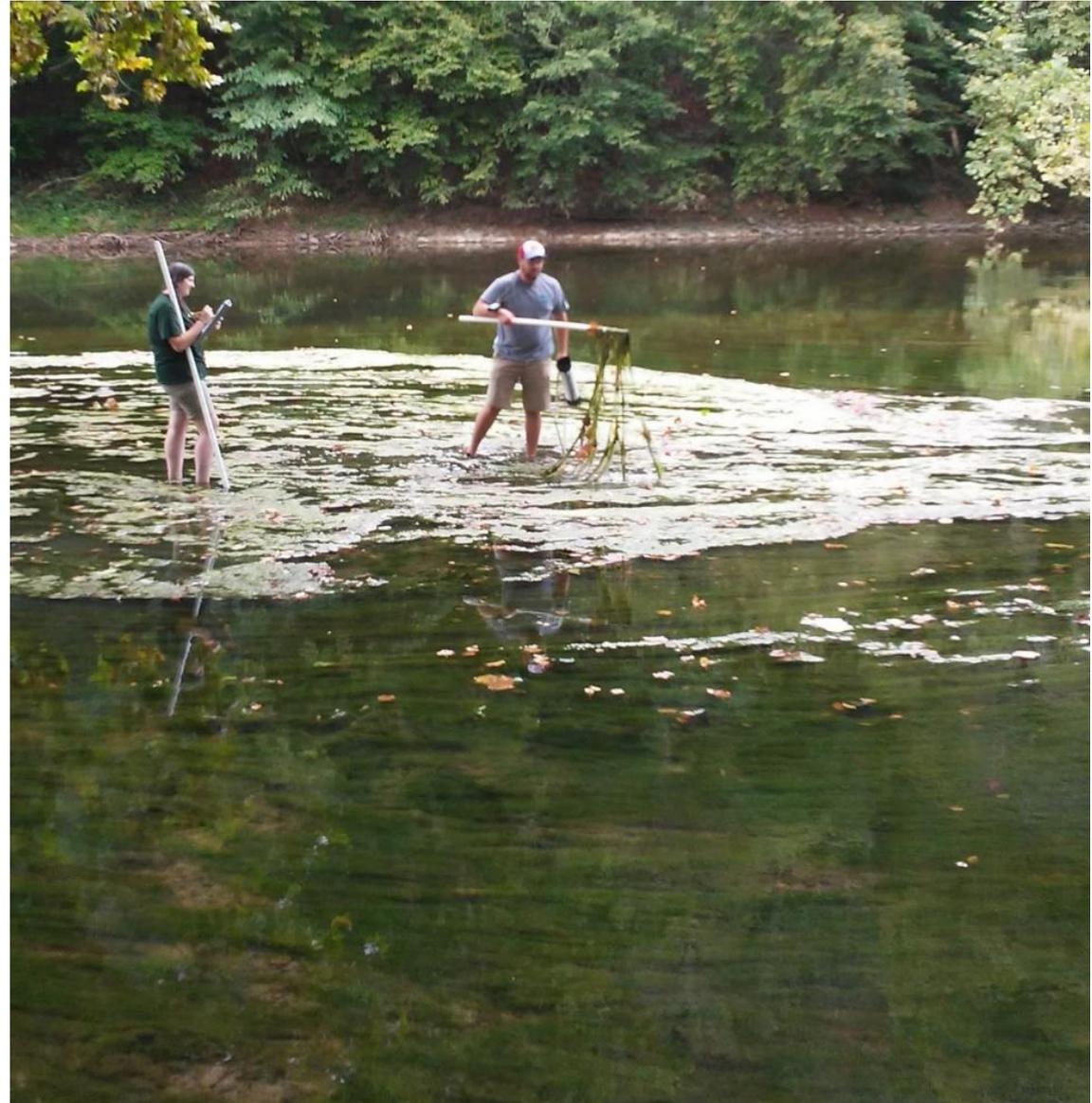
Water Monitoring & Assessment Program

Virginia Department of Environmental Quality

2.24.2020

Quick Overview

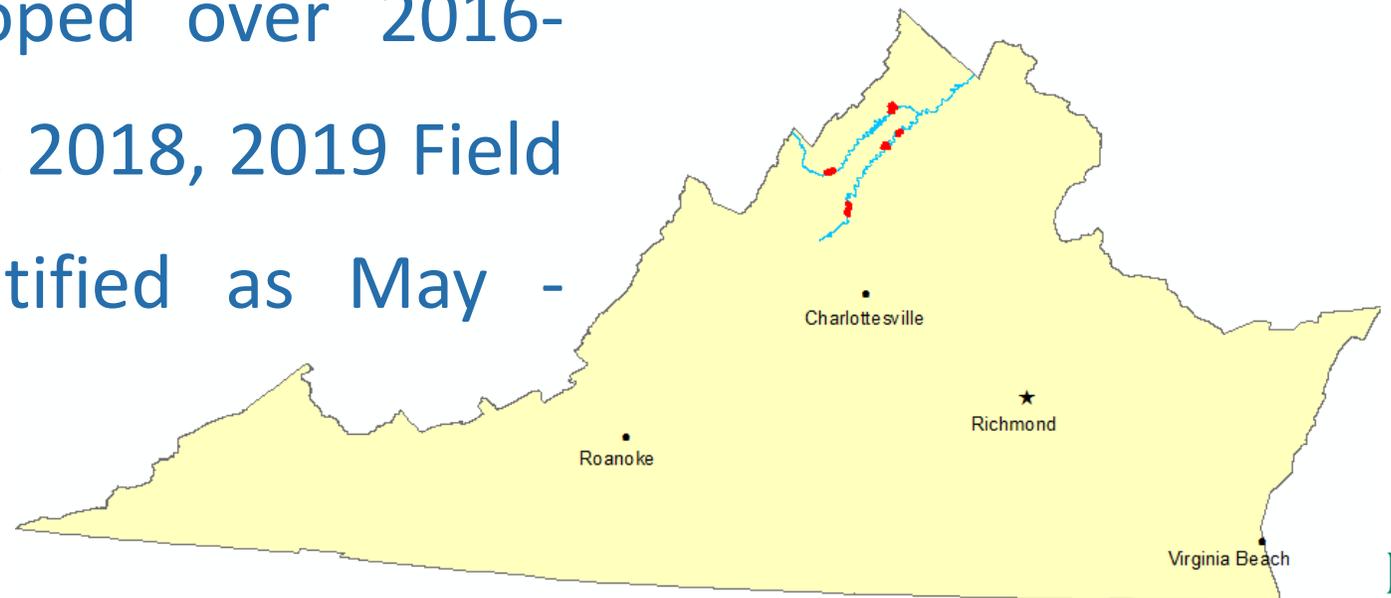
- Issue Background
- Review nuisance algae monitoring methods
- Discuss 2019 Season





Shenandoah Algae Issue Background

- Listed 5 river segments in the 2014 IR (~25 river miles) as having an **observed effect for recreational use** due to excessive algae
- DEQ Committed to follow-up monitoring to develop field methods for estimating probable **nuisance conditions** by filamentous algae
- Field methods developed over 2016-2017 field seasons
- Data collected in 2017, 2018, 2019 Field seasons
- Growing season identified as May - October



Field Methods – Three Stages

- **Stage 1: Visual observation** from the bank for early indications of algae growth
- **Stage 2: Lateral transect** (Surber method) to visually estimate algal percent coverage
- **Stage 3:** Numeric algae densities generated via **algae samples**: measure Biomass in field and lab analyzed **chlorophyll-a** and **chlorophyll-b**, **Ash-free dry mass (AFDM)**



Filamentous Green Algae (FGA)



Bluegreen Algae (BGA)

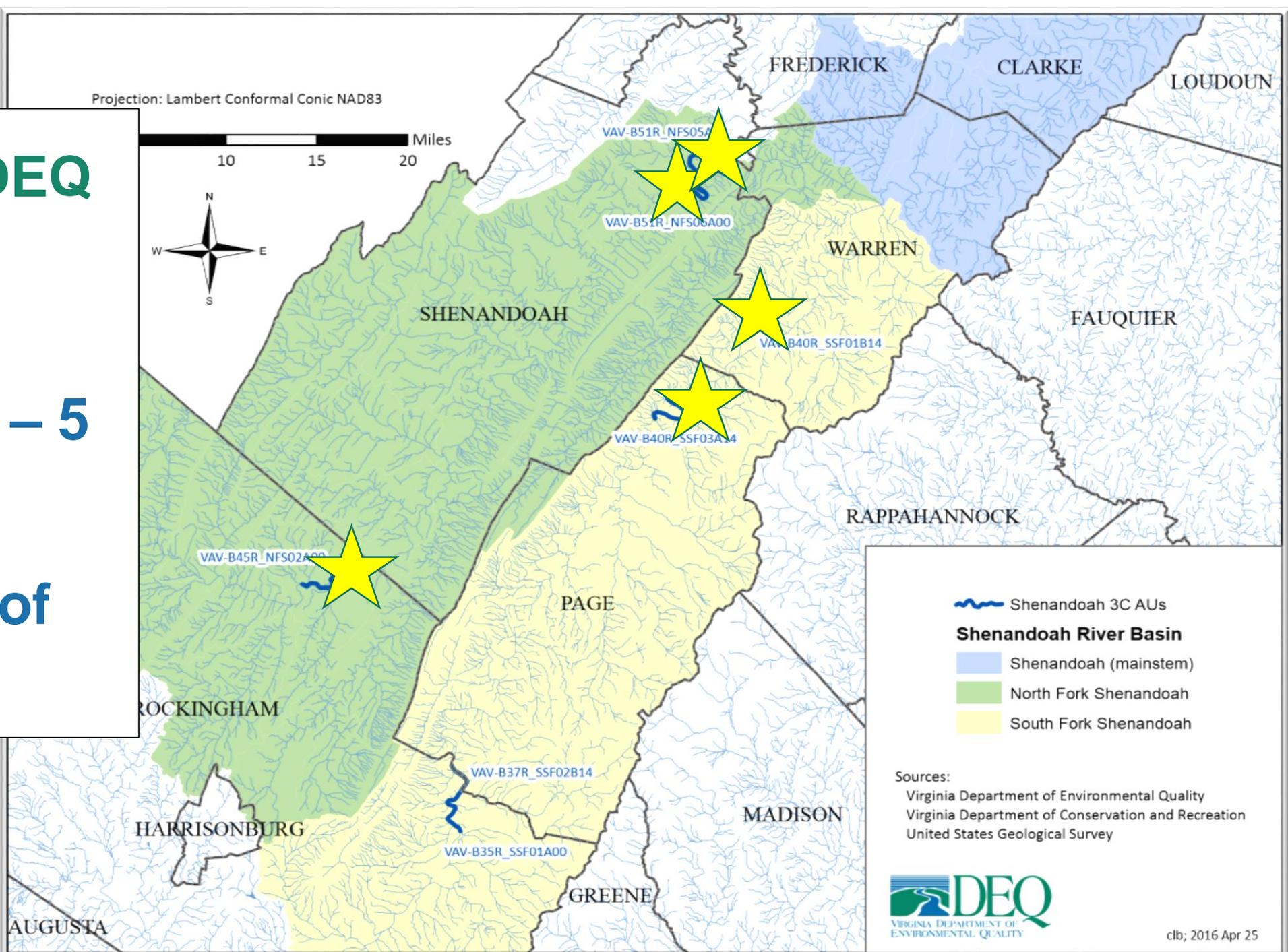


Submerged Aquatic Vegetation (SAV)



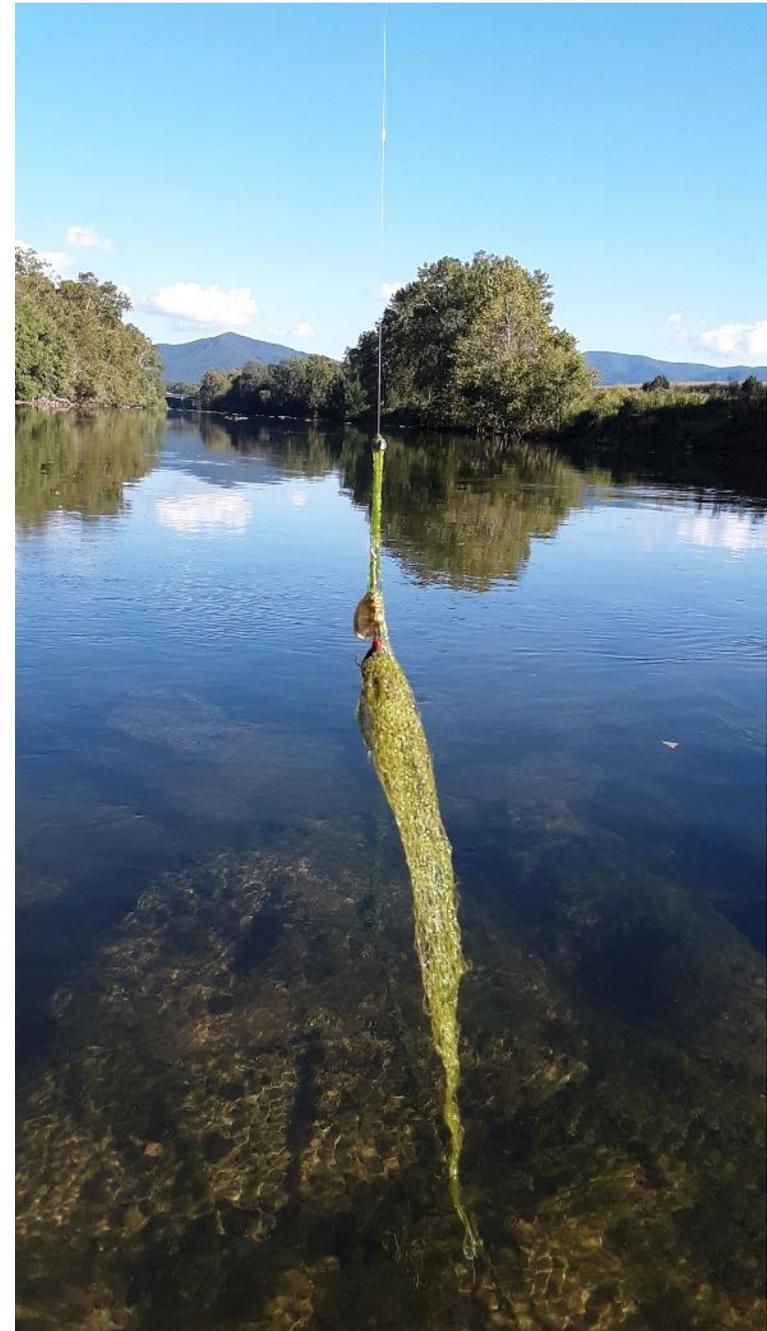
Where is DEQ collecting data?

#1 Priority – 5 EPA/DEQ identified segments of concern



2019 Season Summary

- Priority #2 – Complaint response
- DEQ responds to complaints regarding algae according to the following decision points:
 - Recreation potential
 - Public access to location/segment
 - Resources (staff time)



Sample Collection



**Benthic Chlorophyll-a (Chl-a)
collection using a Surber device**

Sample Collection

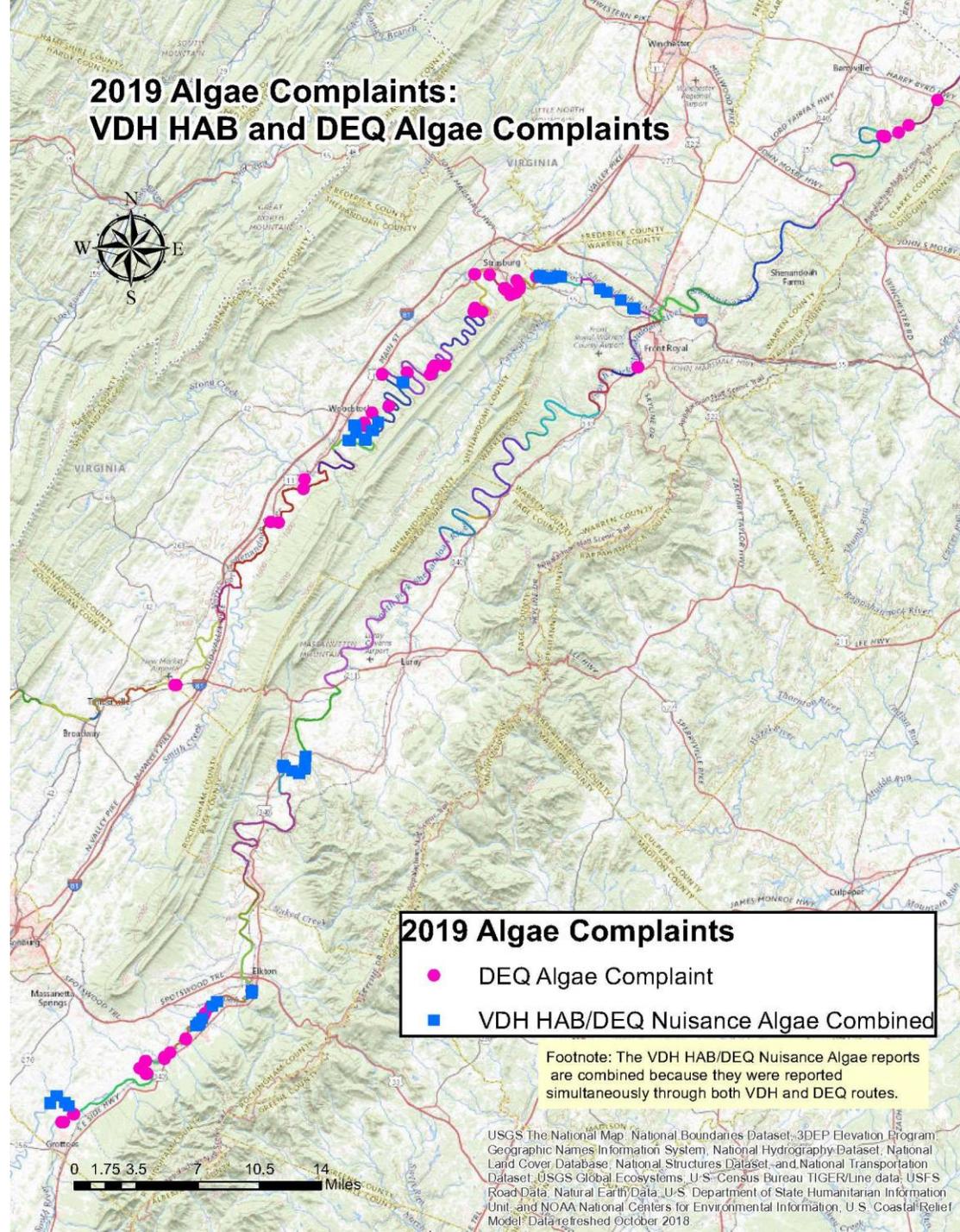


2019 Season Summary – by the numbers

- 25 – Nuisance complaints co-reported as HABs. **ALL of these were investigated by DEQ-VRO staff**
- None of these complaints were seen to have aquatic life impacts or other lines of evidence to indicate a HAB was in effect



2019 Algae Complaints: VDH HAB and DEQ Algae Complaints



2019 Algae Complaints

- DEQ Algae Complaint
- VDH HAB/DEQ Nuisance Algae Combined

Footnote: The VDH HAB/DEQ Nuisance Algae reports are combined because they were reported simultaneously through both VDH and DEQ routes.

USGS The National Map, National Boundaries Dataset, 3DEP Elevation Program, Geographic Names Information System, National Hydrography Dataset, National Land Cover Database, National Structures Dataset, and National Transportation Dataset; USGS Global Ecosystems; U.S. Census Bureau TIGER/Line data; USFS Road Data; Natural Earth Data; U.S. Department of State Humanitarian Information Unit; and NOAA National Centers for Environmental Information, U.S. Coastal Relief Model Data refreshed October 2018.

<http://www.deq.virginia.gov/Programs/Water/WaterQualityInformationTMDLs/WaterQualityAssessments/ShenandoahAlgae.aspx>

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Meanwhile...legal challenges

- May 2017: Potomac Riverkeeper, Inc. challenged EPA's approval of Virginia's 2014 IR
- March 2018: Plaintiff amended the complaint to instead challenge EPA's approval of the 2016 IR.
- March 31, 2019: US District Court (District of Columbia) ruled in favor of EPA
 - *Due, in part, to the DEQ's progress on developing monitoring and assessment protocols*